Watershed Improvement Review Board
Final Report
#5024-009 Muchakinock Creek Watershed AML Sites

Project Name: Muchakinock Creek Watershed

Project Number: 5024-009

Soil and Water Conservation District: Mahaska

Reporting Period: March 1, 2006 – December 31, 2008

Date Report was Prepared: July 11, 2011

Reporting Individual: Cindy Davis

Preparer's Signature: _____

Date:_____

SWCD Commissioner's Signature: _____

Date:_____

Muchakinock Creek Watershed Project
Mahaska County Soil & Water Conservation District
Length of Project: March 1, 2006 – December 31, 2008

Financial Accountability

Summary: Watershed Improvement Funds			
Grant Agreement Budget Line Item	**Total Funds Approved ($)**	**Total Funds Expended ($)**	**Available Funds ($)**
Structures	465,182	437,943.85	27,238.15
Soil Amendments	1,806	11,955.60	-10,149.60
Seeding	33,012	11,573.00	21,439.00
Totals	500,000	461,472.45	38,527.55
Difference			11,472.45

- The only change from the original agreement was that funds were spent on 4 sites instead of 3. The Blom site was originally planned for reclamation, but fell through due to the death of a landowner and the decision of another landowner not to participate. The District submitted and was approved for an amendment, so that WIRB funds could be spent on 2 smaller sites to make up for not being able to reclaim the Blom site. The 4 mine reclamation sites are Roozeboom #1, Herbert, Boender, and Westercamp #1. Using IDALS-DSC AML funding the remainder of the Roozeboom mine site was also reclaimed making it Roozeboom # 2.

Total Project Funding						
Funding Source	**Cash**		**In-Kind Contributions**		**Total**	
	Approved Application Budget ($)	**Actual ($)**	**Approved Application Budget ($)**	**Actual ($)**	**Approved Application Budget ($)**	**Actual ($)**
WIRB	500,000	461,472.45	0	0	500,000	461,472.45
IDALS-DSC-AML	2,506,545.00	1,385,264.82	0*	506,095.84	2,506,545.00	1,891,360.66
Pathfinders RC&D	0	359,113.65	0*	30,411.89	0	389,525.54
Pheasants Forever	750.00	0	0	0	750.00	0
Total	3,006,545.00	2,205,850.92	0	536,507.73	3,006,545.00	2,742,358.65

*No funding estimate was provided in the original application that estimated the amount of in-kind contributions that would be provided by IDALS-DSC, and Pathfinders RC&D.

Watershed Improvement Fund contribution: Approved application budget: 17%
Actual: 16.8%

- Since the Blom site fell through, Pathfinders was able to secure an additional $100,000 because there would be an additional site being reclaimed. Eighty and one half percent of grant funds go towards reclamation of the site. Nineteen and one half percent is used for in-kind or administrative costs.
- In-kind contributions from IDALS-DSC included the costs of surveying, designing, and oversight by private engineering firms hired by IDALS-DSC.
- In-kind contributions from Pathfinders RC&D included administrative costs, information/education activities, etc.

Environmental Accountability

Little water quality monitoring has been completed on the Muchakinock Creek. Monitoring would be very beneficial to help better understand the problems in the creek and to help quantify the benefits of the District's efforts to improve water quality. As an educational opportunity the OASIS Alternate School of Oskaloosa, Iowa completed IOWATER monitoring on various sites along Muchakinock Creek. See Appendix A (page 5), data is available on the IOWATER website at www.iowater.net Biological, Physical/Chemical, and Habitat data was recorded at the sites usually once in the spring and fall.

IDALS-DSC takes water samples from the various "pit ponds" on all sites that were left after the coal was extracted from the ground. These ponds are highly acidic, often in the 2-3 pH range. These ponds are often drained and/or filled during reclamation. In order to drain these ponds the pH needs to be much closer to neutral before being drained into Muchakinock Creek. Treatment of these ponds with hydrated lime raises the pH of the discharge water before the ponds are drained. Periodic sampling ensured that the ponds were drained when the pH was at an appropriate level.

Site Name	Drainage Acres	Acres of AML Sites	Sediment Delivery Before t/ac/y	Sediment Delivery After t/ac/y	Sediment Delivery Reductions t/y
Roozeboom # 1	124	20.5	9.3	2.6	794
Blom *	0	0	0	0	0
Roozeboom # 2	84.5	36	30	4.6	864
Herbert	13	6.2	35	2	234
Boender	31	12.3	16.6	3.7	693
Westercamp # 1	690.7	40.5	6.9	4.2	2661
Totals	943.2	115.5	97.8	17.1	5,246

- Blom site not completed per amendment

Seventy nine and one half acres of abandoned mines have been reclaimed in the Muchakinock Creek Watershed since the start of the project utilizing WIRB funds. An additional thirty six acres (Roozeboom 2 site) has also been reclaimed during the grant period with no leveraging of funds by the District or Pathfinders RC&D, this site was fully funded by DSC. Total acres

treated for the project are 943.2 reducing sediment delivered to Muchakinock Creek by over 5,246 tons per year.

WIRB funds in conjunction with IDALS-DSC and Pathfinders grant funds were spent on structures, soil amendments, and seeding. A total of 4,540 feet of terraces, 3 grade stabilization structures, 2 wetlands, and 1 water & sediment control basins were built on the 4 sites reclaimed. Seventy nine and one half acres of spoil piles and pit ponds were graded and seeded. On Roozeboom # 2 there was 1 water and sediment control basin. Soil loss was reduced dramatically from the estimate 35 tons per acre per year. Soil loss was reduced to 2 tons per acre per year by seeding and grading alone. The installation of structures increased sediment delivery reductions by not only limiting soil loss from the site, but also from all the land that drains into the structures. Total sediment delivery reductions of all the sites combined are 5,246 t/y.

Soil fertility amendments including: lime, mulch, Boron, Nitrogen, Phosphorus, and Potassium were added to the recently graded site in preparation for the permanent seeding. Soil samples are normally taken before amendments are applied to ensure adequate rates. Soil amendments are required due to the high acidity and poor growing conditions of the sites. After reclamation there are sometimes a few small “hotspots” where the seeding does not take. These “hotspots” are re-treated and reseeded. The sites were seeded, with a mixture of native introduced grasses and forbs. Landowners were able to decide what type of seeding went on their site.

On the Northeast corner of the Roozeboom # 1 site, one point eight acres of wetland areas was seeded to a special wetland plant mix suited for wet sites.

Three public meetings were held highlighting the Muchakinock Creek Watershed Project at abandoned coal mine sites. The first and second meeting was held upon completion of the Roozeboom #1 site in 2006. One meeting was with commissioners and landowners the other was with community leaders. The third was held in 2008, prior to the start of reclamation on the Westercamp #1 site. Each of these meetings allowed a firsthand look at the accomplishments of the project. Attendees were able to tour the sites and get an idea of the before and after of the site. Approximately 25 to 30 people attended the 2006 meetings and 55 people attended the 2008 meeting. Guest speakers at the meetings included representatives from IDALS, Mahaska SWCD, and Pathfinders RC&D.

The initial plan was to hold a landowner/stakeholder workshop after the completion of each site, once a year over the 3 years of the project. Since the Blom site was unable to move forward, no sites were completed in year 2. Turnover of project coordinators has also hurt the amount of tours or workshops that have been held.

Signs highlighting contractors, engineers, and the agencies participating in the reclamation were placed at each site. The signs were funded in part by IDALS-DSC and also Pathfinders RC&D. The signs were placed in prominent locations along roadways and large enough to be viewed from the road.

Summary: Practices and Activities

Practice or Activity	Unit	Approved Application Goal	Accomplishments	Percent Completion
Tour/Workshops	No.	3	3	100%
Abandoned Mine Reclamation Sites	No.	3	5	166%

The reclamation of the 4 sites utilizing WIRB, IDALS-DSC, and Pathfinders RC&D funds (Roozenboom #1, Boender, Herbert, Westercamp #1) and the Roozeboom # 2 site using IDALS-DSC prevents over 5,246 tons of sediment from reaching Muchakinock Creek annually.

The sites have become much more valuable toward wildlife and a safer environment to the landowners. The ponds now have clean water that can support a vibrant aquatic organism community. A much larger variety of animals will be able to call these sites home.

Program Accountability

The only major problem experienced during the grant period was the inability to complete reclamation of the Blom site. There are several sites in the watershed that can be reclaimed, but there is extensive preparation work for each site that needs to be completed before construction can begin. The District was fortunate that the two other sites were able to be completed within the WIRB grant agreement timeline.

Utilizing the WIRB funds helped the District expand the Muchakinock Creek Watershed Project to include abandoned mine reclamation. The current project utilizes WSPF and 319 funds to install BMPs on mostly agricultural land. The District was aware that abandoned coal mines were a large contributor of sediment and other pollution to Muchakinock Creek. However; funding is very limited in reclaiming sites. WIRB funds have helped tremendously in expanding the District's efforts into a comprehensive project, using numerous partnerships, to address the problems detrimental to Muchakinock Creek. All partners are working towards the common goal of improving water quality in Muchakinock Creek and ultimately removing the creek from the DNR's impaired waters list.

This cooperation has reduced sediment and acidic run off from 115.5 acres of AML in the watershed. These mine reclamations would not be possible if not for all the partners working together to restore the land back to its natural beauty as it was before the mining.

Appendix A:

Summary of IOWATER collected data for the Muchakinock Creek Watershed

Over the years, five sites in the Muchakinock Creek watershed in Mahaska County have been sampled by IOWATER trained volunteers using IOWATER methods. Figure 1 shows the location of the five sites within the watershed. To view data collected for these sites, visit the IOWATER website at www.iowater.net.

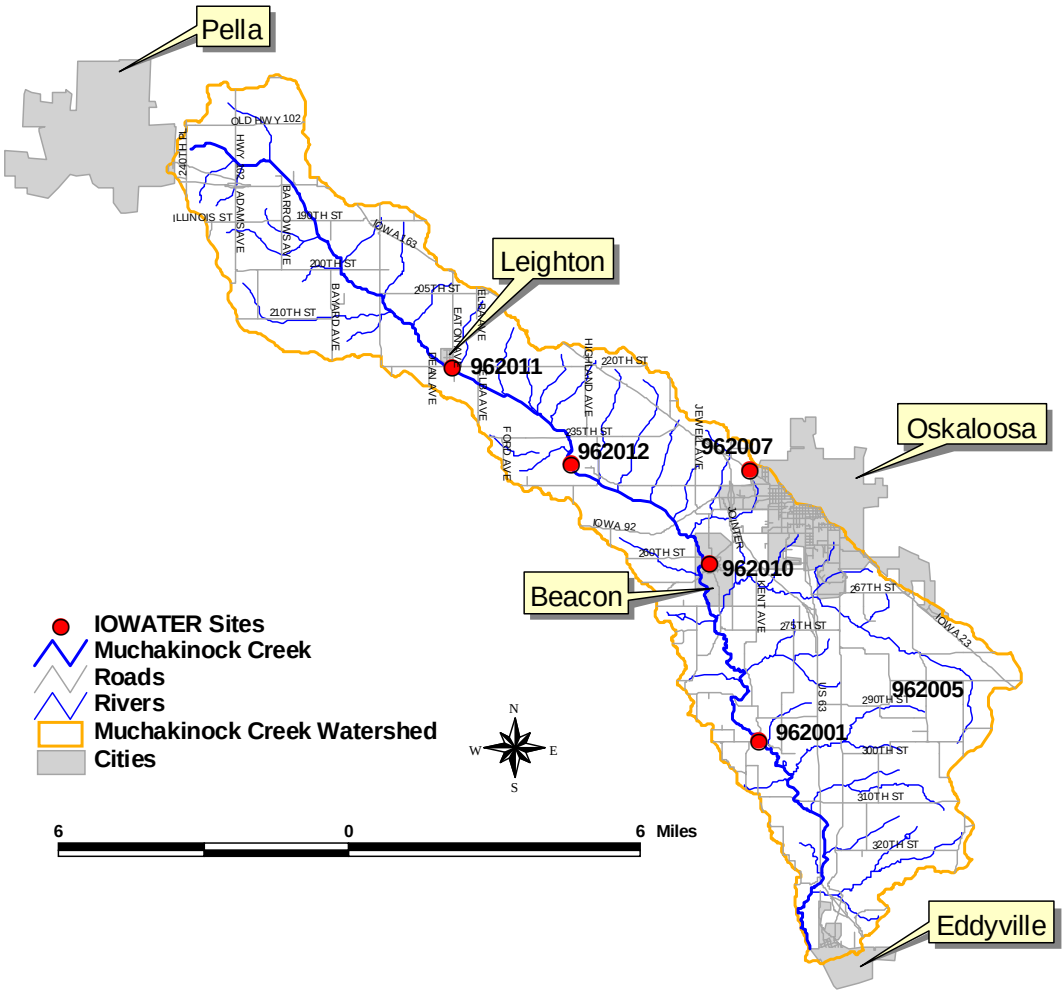


Figure 1. Location of IOWATER sites within the Muchakinock Creek watershed in Mahaska County.

Table 1 identifies the sites monitored, the time frame during which the sites were monitored, and the number of data assessments available from the IOWATER database at www.iowater.net.

Table 1. Available water quality data from the IOWATER database.

IOWATER Site Number	IOWATER Site Name	Location (UTM X and UTM Y coordinates)	Number of Biological Records	Number of Chemical/Physical Records	Person Monitoring the Site	Period of Monitoring
962001	Muchakinock Creek	528122, 4563580	1	2	David Knox	7/2000-7/2001
962007	Elementary Catch-Basin West	527864, 4572580	8	13	Alternative Program Oasis	10/2003-8/2009
962010	Munchi Creek, Beacon	526536, 4569428	0	4	Alternative Program Oasis	10/2005-5/2007
962011	Leighton, Munchie Creek	517976, 4575977	3	4	Alternative Program Oasis	10/2005-5/2007
962012	Evans, Munchie Creek	521911, 4572733	0	3	Alternative Program Oasis	11/2005-9/2006

Biological Monitoring

For three of the five sites in the Muchakinock Creek watershed, biological assessments were completed using IOWATER methods. For a biological assessment, benthic macroinvertebrates (aquatic insects) are determined to be present or absent. The benthic macroinvertebrates are identified as high quality organisms (pollution intolerant), medium quality organisms (somewhat pollution tolerant), and low quality organisms (pollution tolerant). Figure 2 shows the distribution of benthic macroinvertebrates for the three sites. Sites 962007 and 962011 had multiple biological assessments completed. Overall, very few organisms representing low diversity were sampled at the three sites.

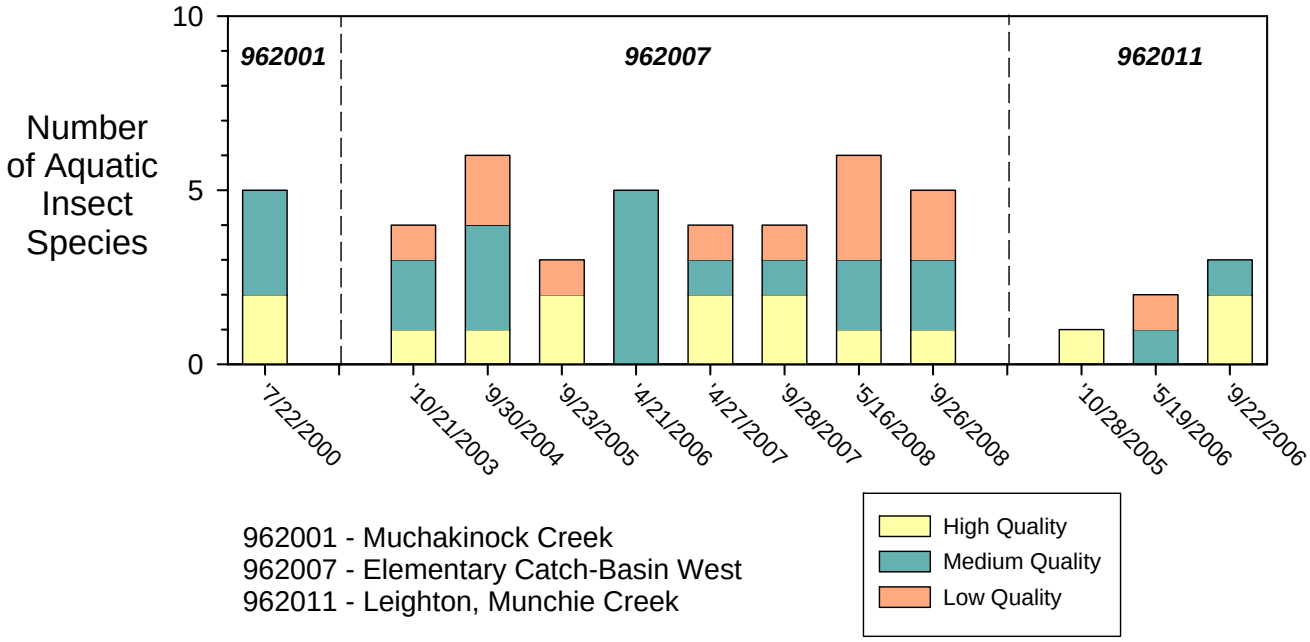


Figure 2. Distribution of aquatic insects sampled using IOWATER methods.

Chemical Monitoring

For all five sites in the Muchakinock Creek watershed, chemical/physical assessments were completed using IOWATER methods. Chemical/physical assessments include pH, dissolved oxygen, nitrite-N, nitrate-N, phosphate, chloride, temperature, and transparency. Figures 3 and 4 show the chemical/physical results for the five sites.

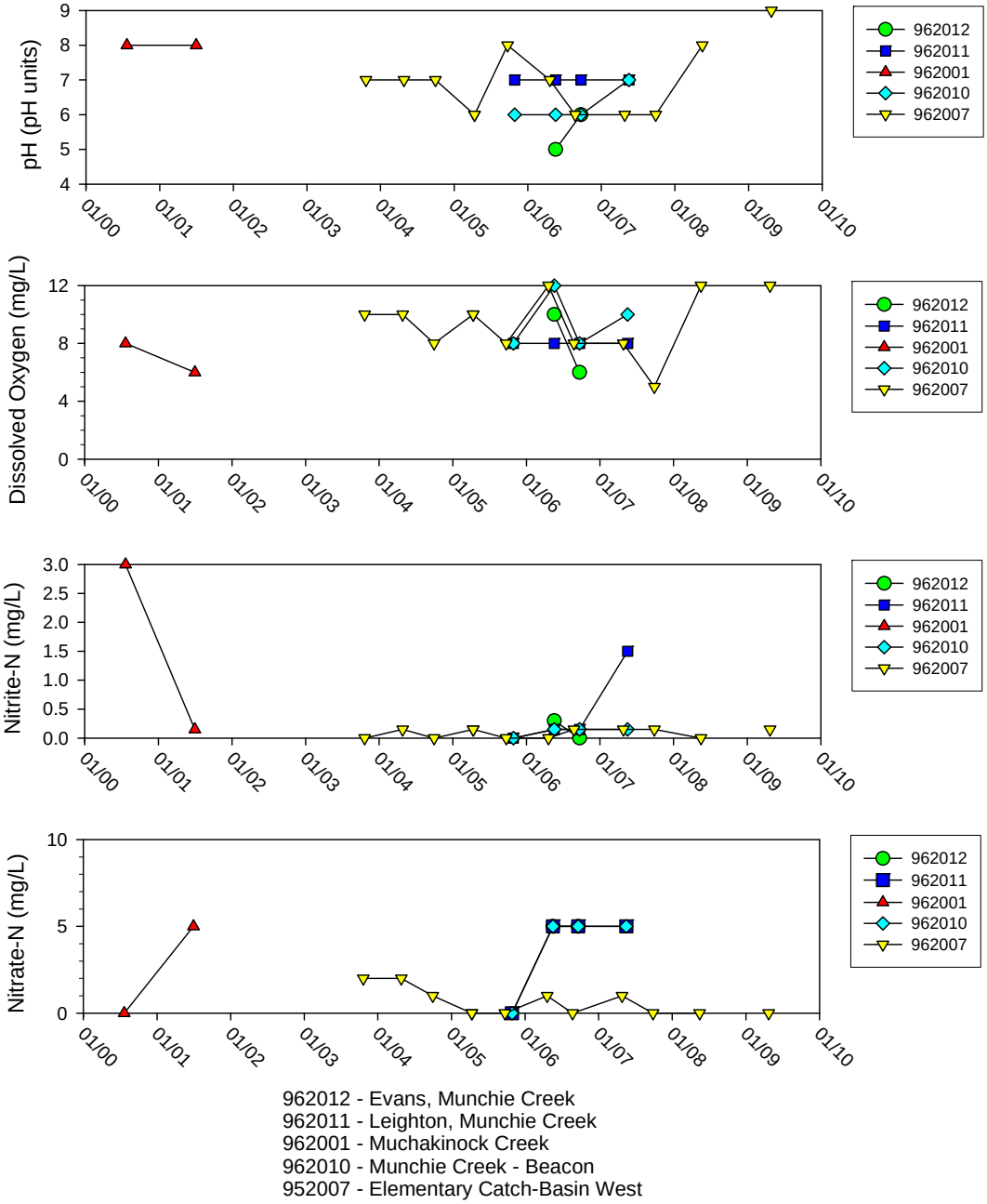


Figure 3. Water quality results for pH, dissolved oxygen, nitrite-N, and nitrate-N for the five sites monitored in the Muchakinock Creek watershed. (mg/L – milligrams per liter)

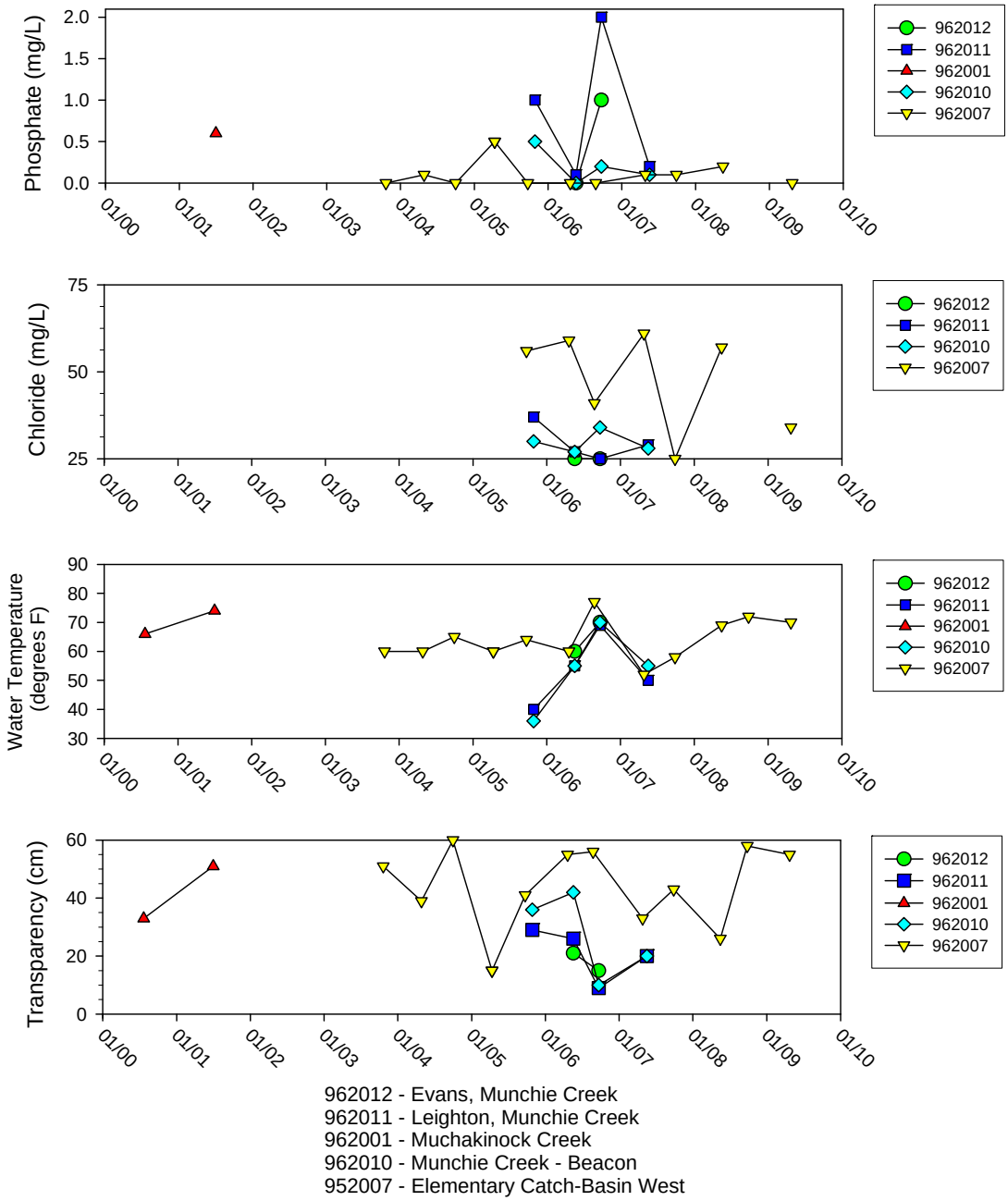
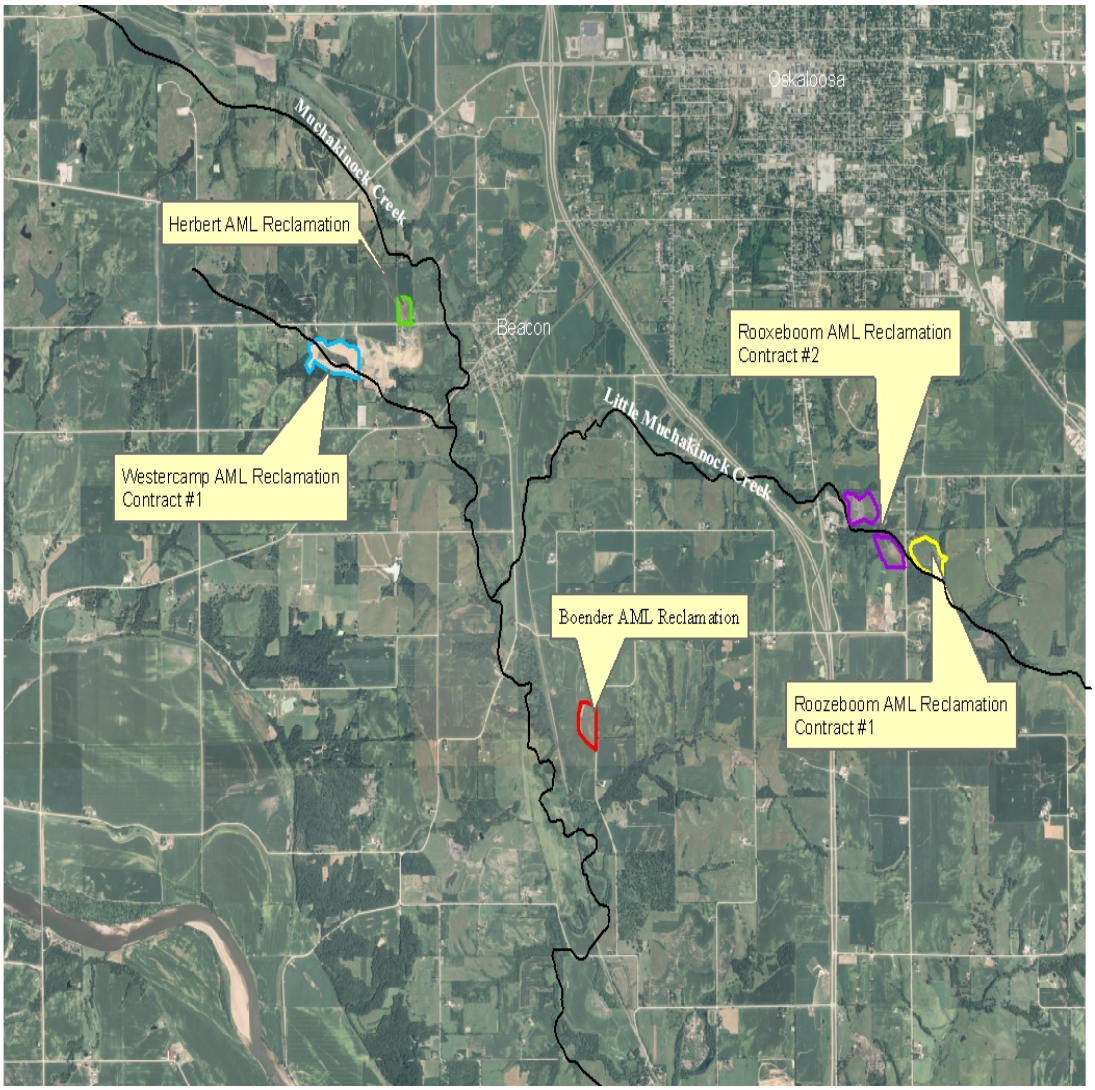


Figure 4. Water quality results for phosphate, chloride, temperature, and transparency for the five sites monitored in the Muchakinock Creek watershed. (mg/L – milligrams per liter; cm – centimeters)

For perspective, typical pH levels for streams in Iowa vary from 8.0 to 8.4. Dissolved oxygen ranges from 8.7 to 12.9 mg/L. Nitrate+nitrite-N ranges from 3.0 to 8.5 mg/L for streams in

Iowa. Phosphate is typically in the 0.22 to 0.34 mg/L range. Chloride tends to be low, with an average of 22 mg/L for streams in Iowa. Transparency and water temperature can be quite variable depending on the time of year and rainfall conditions.

Submitted by Lynette Seigley
June 3, 2011


Oskaloosa
Muchakinock Creek
Herbert AML Reclamation
Beacon
Rooxeboom AML Reclamation
Contract #2
Little Muchakinock Creek
Westercamp AML Reclamation
Contract #1
Boender AML Reclamation
Roozeboom AML Reclamation
Contract #1

Roozeboom #1 site before

Roozeboom #1 site before

Roozeboom #1 site after

Roozeboom #1 site after

Roozeboom #1 site signage